FINAL REPORT

INSTRUMENTED SPHERE EVALUATION OF POTENTIAL FOR BRUISE INJURY DURING HARVEST

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INSTRUMENTED SPHERE: EVALUATION OF POTENTIAL FOR BRUISE INJURY DURING HARVEST

A. EXECUTIVE SUMMARY

The objectives of this Instrumented Sphere - Bruise Potential Evaluation Project are:

a) to increase the awareness of the importance of proper handling of potatoes during the harvest process; and

b) to provide members with technical support and a tool for assessing the bruising potential of their harvesting equipment, with corresponding bruise prevention management.

Instrumented sphere technology is used to identify areas in the harvesting process where equipment and/or handling may result in bruising of potatoes going in to storage. Since a bruise site is an area of potential disease entry, as well as decreasing the potato's quality, it is important to spot areas where equipment adjustments, additional padding or alternate handling procedures may reduce bruise potential. By running the instrumented sphere through the harvesting and handling equipment, we obtain a computer analysis of the strength and duration of impacts received by the sphere while it is in the equipment. From this we are able to determine where the trouble spots are so as to suggest ways of alleviating any problems.

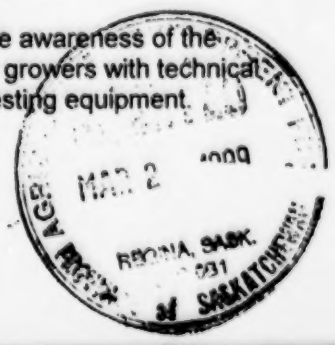
This technology not only shows what needs to be adjusted, but also where adjustments have been beneficial. A good illustration of this was with two trans-load lines working side by side. One had been more "fine-tuned" than the other. The sphere was run through each line. The difference between the amount of bruise potential of the two lines was striking. The equipment foreman was able to take the results back to his foreman to show him that the extra time and effort put into adjusting the one line had made a significant difference, and suggested that the other line be similarly adjusted.

B. TECHNICAL REPORT

a) Background and Objectives

Seed potatoes, like all horticultural products, are easily damaged by any handling process, particularly during the highly mechanized harvest activities. Bruises to the potato tissue caused by improper calibration of equipment or rough handling, can be an entry point for disease, and a source of moisture loss. If too much bruising occurs, the quality of the product in storage can be quickly compromised, resulting in economic losses from reduced prices for lower quality and increased costs for control of storage diseases.

The objective of this project is twofold: firstly to increase the awareness of the importance of proper handling of potatoes, and secondly to provide growers with technical support and a tool for assessing the bruising potential of their harvesting equipment.



b) Project Activities

The instrumented sphere and supporting video equipment was purchased in time for the fall harvest operation. A few days were spent calibrating the sphere, learning how to operate the video and sphere software, and learning how to interpret the data generated. Several practice sessions were held at the University of Saskatchewan Horticulture Field House.

Several members requested that the sphere be used to evaluate their harvest equipment and handling facilities. We were also asked to run the sphere through a fresh-pack plant to evaluate any problem areas in their washing and packing process. Field trips were made to the various growers to run the instrument through the harvesters, trans-load lines and storage lines. Video footage of the sphere moving through the equipment was taken to provide visual confirmation of the areas of concern and to aid in the later analysis of the data.

Bruising can occur during any handling process, and members are interested in making certain their product is shipped to their customers in the best possible condition. This increased awareness has members beginning to book spring visits to run the sphere through their equipment during the movement from storage.

c) Performance Indicators

The instrumented sphere, a video camera, a monitor and incidental equipment were purchased for use starting with the 1998 harvest. After the first field trip, it became evident that we would need a stable power supply for the computer equipment and more than one camcorder battery. We purchased an AC/DC converter for use in automobile cigarette lighters and a long-life camcorder battery. Other incidental equipment purchased was a voltage meter reader to measure the energy levels in the sphere. It is important to have the sphere charged at adequate levels to allow it to operate for two to three hours at a time between charges.

We had difficulty in obtaining a dust-proof camera case. Initially, we were advised that such a case was readily available but when we went to purchase it, found that it was not at all suitable to our purposes. As a result, we commissioned the building of a special case by a local plastics manufacturer. Although it is not likely to be fully dust-proof, it should provide adequate protection for the video equipment during filming in field conditions.

One of the problems with the equipment is that once the sphere is run through the equipment several times it becomes covered with soil and, although it is brightly coloured, it does become harder to pick out amongst all the potatoes and debris. It is important to have a "spotter" readily available to pick up the sphere at the end of its run, otherwise it can easily get lost in the pile. We have spoken to the manufacturer and are working on various solutions to help alleviate this problem.

The process takes somewhat longer than anticipated. A full day in the field and at the storage sheds is required to gather enough data for adequate analysis. This means that if all members were to request this service at one time, it is not likely we would be able to provide the service in a timely manner. It should be noted that one of our members, SPUDCO, decided to purchase its own sphere. After seeing the information provided by our sphere, SPUDCO thought it would be a valuable tool to offer to its partners. This should help alleviate

any possible timing problems we might encounter. The sphere they purchased is a different shape than the one that SSPGA purchased. The SPUDCO sphere is oblong and blocky, shaped more like a Russet potato, whereas ours is spherical. We intend experiment with the two spheres, running them through the same line at the same time to see if there are any major difference which occur in the bruise potential readings. This type of comparison has not been done before. It should tell us whether our growers need to make adjustments to their equipment for different varieties. The manufacturer of the spheres is interested in the outcome of our contemplated experiment.

Initial training with the sphere was not as efficient as had been anticipated. We did receive very good technical support from the manufacturer. We spent several hours on the telephone with their representative discussing data analysis and reviewing some of the charts and graphs generated from the data we had obtained. We were disappointed with the response of our sister Association in Alberta. Although ASPGA have had a sphere for several years, they were not at all willing to speak with us about their experiences. We have a good grasp of the basics of the data analysis, but will require more experience to confidently interpret the finer nuances of the program.

d) Industry Use and Deliverables

In the fall of 1998, about fifteen percent (15%) of our membership took advantage of the instrumented sphere service. Personnel spent over one week of the harvest period in the field with the sphere Data collection was done in the fields with the harvest equipment, at trans-load sites, at the fresh-pack plant and at storage loading sites. The SSPGA Board of Directors decided that the service would be provided free of charge to Association members. As noted above, members are already inquiring about spring bookings and we anticipate a busy fall.

C. EQUIPMENT PURCHASED

Instrumented Sphere (Impact Recording Device), Serial #4270-270
JVC Video Camera (Serial #09383480), extra battery, video carrying case and tape supply
Video Monitor/TV, Serial #511500
Power Cable Converter DC/AC
Dust-Proof Video Case suitable for filming
Voltage Meter

The Association uses its existing computer equipment for programming the sphere and data analysis.

D. INNOVATION FUND ACKNOWLEDGMENT

The Agri-Food Innovation Fund is acknowledged as providing funding for the project through the SSPGA Spudnotes Newsletter, at the Annual General Meeting of the SSPGA and at the PPC/SSPGA '98 Tradeshow were the equipment was on display .